

Low Power Ain't No Power – Licensed Systems

by John Deveck

[BALTIMORE, Maryland - January 2004] Experimentation in 1972, using an induction cable buried alongside Century Boulevard entering Los Angeles International Airport, gave birth to what we now know as the "Travelers Information Service" (TIS) system. After years of testing, experiments and general mucking about, that system became the basis for the new FCC rules (§90.242), which were adopted in 1977. Since then, numerous companies have grown up to supply these systems. Some have gone away again, and some have been renamed, swallowed or conglomerated. But, through it all, the systems remained a bit of an enigma.

I could confuse this further and discuss the Radiating Cable version of these systems as well. I think I will do that later, but you should note that there is one with its own set of regulations under §90.242(b)(3). LAX included both vertical antenna and radiating cable systems for coverage at various times. The original system included two independent induction (aka Radiating or Leaky) cables, on the approach road and the terminal area. Over the years there have been several versions of these systems, for testing and other reasons, although most are now inoperative. The important thing is the §90.242 regulations *do* include that option.

Most people know about TIS, in a general sense, from the signs on the road, but very few know the real rules. Most casual listeners do not know (or probably care) if the systems are licensed or not, and most hobbyists assume that they are "Part 15" systems without licenses. Even many broadcast engineers assume these are either unlicensed Part 15 systems or licensed Part 73 sites. Well, neither is correct, and it is important to know why.



TIS/HAR SYSTEMS

The FCC developed the rules for Travelers Information Stations (aka Highway Advisory Radio or HAR) with the intent of creating a non-commercial method for reaching a large audience on the highway and guiding them through traffic confusion – construction, airports, accidents, urban exits, etc.

To borrow the words directly from §90.242(a)(7), these may transmit "...only noncommercial voice information pertaining to traffic and road conditions, traffic hazard and travel advisories, directions, availability of lodging, rest stops and service stations, and descriptions of local points of interest. It is not permissible to identify the commercial name of any business establishment whose service may be available within or outside the coverage area of a Travelers Information Station. However, to facilitate announcements concerning departures/arrivals and parking areas at air, train, and bus terminals, the trade name identification of carriers is permitted."

It seems pretty simple, right? Well, it often gets confused in the rush to acquire the systems. In part because the rules as to who can actually license these systems are somewhat muddled by two issues: The first being that licensees are supposed to come from the "Public Safety Pool" under §90.20 "(1) Any territory, possession, state, city, county, town or similar governmental entity is eligible to hold authorizations in the Public Safety Pool to operate radio stations for transmission of communications essential to official activities of the licensee, including: (i) A

district and an authority, but not including a school district or authority or a park district or authority except as provided for in Sec. 90.242;(ii) A governmental institution authorized by law to provide its own police protection." Then the FCC changes things in §90.242 to allow park districts and authorities, but not school districts or authorities (that change has been proposed, but is not yet official).

The second muddle is the restrictions in location under §90.242(a)(5), "The transmitting site of each Travelers' Information Station shall be restricted to the immediate vicinity of the following specified areas: Air, train, and bus transportation terminals, public parks and historical sites, bridges, tunnels, and any intersection of a Federal Interstate Highway with any other Interstate, Federal, State, or local highway." But nowhere is "immediate vicinity" defined. We have to make (shudder) assumptions about that and hope that no field inspector disagrees.

What we do know with some concrete authority is that the rules do authorize TIS systems from 530 kHz to 1700 kHz, in 10 kHz steps as a secondary service only. So, suffice to say the systems are to be run in the conventional AM band, and should be operated by some form of a governmental agency, or authority.

COVERAGE POTENTIAL

Well, according to §90.242(b)(4)(iv), "The field strength of the emission on the operating frequency shall not exceed 2 mV/m when measured with a standard field strength meter at a distance of 1.50 km (0.93 miles) from the transmitting antenna system." And also, the power level cannot exceed 10 watts in order to achieve the above field strength, and the antenna may only be vertically polarized.

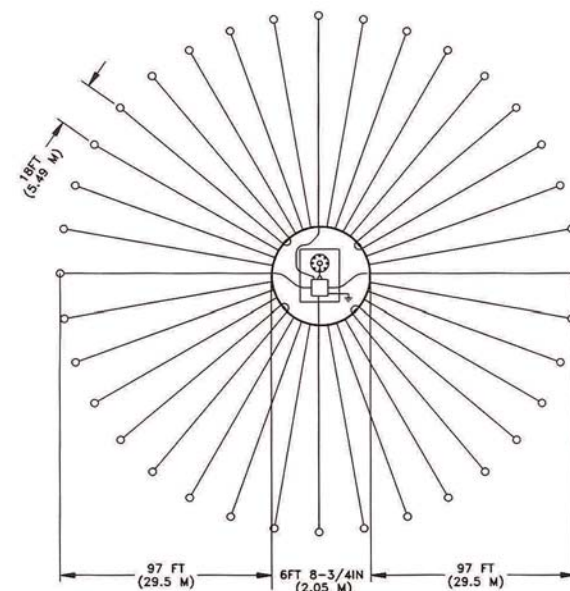
What does that really mean? Well, in most cases, with a well designed ground plane, properly tuned antenna, and a reasonably clear frequency, the systems often reach 5 miles, and beyond, in real coverage. In more urban settings, with crowded bands, it may well be less. You may, however, install multiple facilities and synchronize their carriers, to achieve increased coverage over a prescribed critical area.

Installations are best, like any AM system, with a good earth ground plane. Systems mounted on trailers, rooftops and other compromise sites are typically effective over much shorter ranges. Permanent installations with nice radial ground planes (12 or more radials of 100 feet or more) perform far better.

Options abound for antennas as well, from simple marine whips (Morad) to uni-poles (LBA) to single sticks (Valcom). All have their values in installation and perfor-



mance, depending on your target area, installation location options and budget. The regulations do restrict your antenna to a maximum height of 15 meters above ground level, so do not start thinking about a tower, OK?



PROGRAMMING POTENTIAL

As the rules say, the systems are really aimed at traffic support. Whether it is used to alert drivers on I-95 to a crash and bottleneck, or citizens of Glastonbury, CT to a fire in progress, the main purpose is *public safety*. If you have a valid need for traffic control or public safety information, you will almost always be able to get a TIS license. In some cases, private businesses have purchased the equipment and given it to the local municipality, which holds the license.

This has been done, for example, around auto racing facilities, which cause multi-mile traffic jams during events. The community runs normal public safety and traffic information all year, but on the fateful weekends of races, they focus on directions and traffic control for the big event. Never using the commercial venues name, one can still announce "race event attendees should use exit 9 and head south on Route 1 in order to avoid congestion" and provide a legitimate public value, without creating commercial value.

While the rules do not permit schools and districts from licensing these systems, I can think of several examples where schools utilize the systems for parking and traffic control during events, but the license is held by the city. In most cases, these are symbiotic relationships where the community is benefiting by easing traffic issues and uses the system for community information the balance of the time.

There are even exemptions available from the FCC for critical coverage areas. Installations at a number of chemical and nuclear facilities have emergency authorizations for power levels

of up to 100 watts to clear people from the region in a disaster situation. Some locations, like Dallas-Fort Worth International Airport, are authorized for higher power levels in order to achieve adequate coverage of the multiple metro



LPB Model AM-30TIS

areas that they serve. In all of these cases, an exemption may be requested from the FCC, assuming there is reasonable justification for the increase.

WHAT KIND OF GEAR DO I NEED?

First, a transmitter, obviously, which can be found via a number of sources: LPB Communications, Quixote Systems, Radio Systems all manufacture the units, and sell them through various channels. Second, an antenna combined with a tuning unit, to ensure a clean match and maximum efficiency in the basic system. Third, a good ground system. Finally, a good audio source.

(Continued on page 18.)

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One major comment for those out there that use or want to use these systems – they are restricted to voice-quality audio bandwidth, by a required roll-off filter over 3 kHz.

This means watch your programming! If you program a digital recorder via cell phone, and have a lisp, and are standing beside a high-



LPB Model ATU-30

way on a windy day ... well, we have all heard the resulting audio on a TIS at some point, have we not?

Digital audio is cheap now. You can get automation systems, simple repeaters and more, to make sure you operate with many messages, proper timing and clear audio. Buy a simple program like Cool Edit (now called Adobe Audition), or any of its ilk, to make your basic recordings.

You can play them back from CDs, digital repeaters, PCs and many other sources. Think about the kind of thing you use in your radio studio – an Instant Replay will do just fine, as would many similar systems.

You can link your audio source and your transmission source in many ways, but direct lines are always preferred. You can use wireless, depending on the locations, but it is nice to have a hard wired backup in place – remember this is a *public safety* system.

IT'S THE CONTENT, STUPID

Just as with all radio broadcasts (pay attention you 20 song playlists out there) content will gain listeners or run

them off screaming. You are trying to *help* people. Remember that, and remember you need to make your messages clear and concise. Drivers have a short attention span, and should not be forced to listen to things like NOAA weather (a ridiculously common audio filler on TIS systems) when looking for traffic updates. You want content the driver can relate to, and that is either universal or timely.

The more messages, the better chance you have of reaching listeners. *Do not* leave your system repeating things like the FCC ID number and “Don’t forget to Buckle Up” for hours on end. If you have a system for public safety, make sure it contains enough information to get people’s attention! Once people tune in and find junk messages, they will never tune back in.

If you can, set up a system with live access, so a traffic center can update messages as needed. There is a wonderful system in Chicago (or was when I last visited) that is updated constantly and covers much of the city with multiple locations and clear messages. It was actually helpful to me as a driver, maybe not as much as a 40 mm cannon might have been, but you get the point.

TIS systems are yet another option in the little known world of *legal* low power radio stations. Take some time and review FCC §90.242 and you will find new options for your community, or maybe some of your clients. If you are in need of a way to communicate real public safety information, from parking to disasters, you need to know about this rule and these systems.

John Devecka is the Operations Manager for WLOY at Loyola College in Maryland. He would be happy to discuss issues about TIS and HAR systems via email at wloy@loyola.edu as his phone mail system seems to get clogged after each column appears. Thanks for reading!

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Tech Tips

Home Made Tools Save Time ... Save Life

by John Stortz

[TAMPA, Florida - January 2004] Here is an easily homemade tool that falls in the “Why didn’t I think of that years ago?” category.

INSPECTION PROBLEM

When doing a tower lighting inspection, how can an engineer know if the photocell will work properly without waiting around until dusk or dawn? Here is my solution to the problem: a tool made from one of those 18 or 48 ounce oatmeal (or similar style) round boxes and attached to an appropriate length of 1/2 or 3/4 inch PVC pipe.

All it takes to mount the box to the PVC handle is a bungee cord or some duct tape. By using a dry oatmeal cardboard box, rather than one of metal, the project results in a lightweight and easy to use tool. Painting the box flat black on the inside helps absorb light.



The PVC provides a handle long enough for the engineer to place the can safely over the photocell without needing a ladder. Covering the photocell simulates dusk and the tower lights should switch to the night mode within about a minute. Remove the tester and the tower lights should return to day mode. What about those horizontal sensors on the side of tower or building? The use of the bungee cord makes it easy to adapt the tool to whatever angle makes it easiest to cover the photocell.

MODE AND SAFETY CHECKING

And while checking those tower lights, take a moment to be very sure they *all* turn off when removing the tool. This is especially important on taller towers. We recently had several sidelights burn out because lightning had caused one of the solid-state relays to lock “on.” The small 110-watt lights were simply not bright enough to be noticed from the ground in the daytime, so the lamps just burned day and night, until they failed. Eventually, I realized this would be another good application for one of those cheap neon indicator lamps.



I first discovered those little neon indicator lamps while still fairly new to broadcast engineering. I used to short out everything with the shorting stick – not only the HV capacitors, inductors & transformers, but also the incoming power terminals. One time, I had forgotten to turn the 150 Amp main breaker off before shorting the incoming power. The resulting sparks, smoke and sound nearly scared me out of my socks and shoes! That event got me wondering what might help prevent another pyrotechnic display, yet provide good safety.

These lamps use about 1/4 watt and will last for years. Any normally closed cabinet with power controlled only by an external circuit breaker or fuse would be a good candidate for an internal neon light. The purpose of the light is just an extra warning to whoever opens the cabinet, reminding them the power is still on. The best place to put them is somewhere near the line inputs. It becomes a nice safety warning when you open the transmitter if you forget to turn the power off.

When purchasing neon lamps, the 240 volt version will last longer – buy extras. I prefer indicators which can slip into a panel hole, have an internal resistor and insulated wire leads; these can be picked up for \$3 to \$5 each. Another good place to hang one of these neon indicator lights is across the main power feed(s) of any equipment or the output of any breaker where danger could be present.



ALWAYS USE CAUTION!

I still short out the incoming power feed, as well as the other stuff, before sticking my hand into a transmitter. While neon indicator lamps have a predicted life of at least 100,000 hours, a power surge might have shortened that life to zero. I would much rather have another sparks and sound event with a shorting stick, than having that energy passing thru part of me. Remember: The life you save might be your own!

John Stortz, is Chief Engineer of WKES in Lakeland, FL. You can contact him at jstortz@juno.com